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On the Sickness and Mortality among the Troops in the West Indies.

Prepared from Official Documents, by Capt. A. M. TULLOCH, F.S.S., &c. &c. Part III.—(Concluded from p. 230).

IN our two former articles we have shown the influence of the climate of the West Indies on the health of white troops alone; we shall now proceed to investigate its effect on the negro race, of which the black troops are especially composed.

In this portion of our investigation we labour under the difficulty of possessing no information regarding the mortality to which this class of men are subject in their native country, which is the only correct standard whereby we can estimate with any degree of accuracy, the influence of other climates on their constitutions. So far as statistical enquiries have extended, however, there is no country, either temperate or tropical, in which the mortality among the indigenous civil inhabitants between the ages of 20 and 40 seems materially to exceed 15 per 1000 annually; and probably there is no country where troops composed of the indigenous inhabitants are subject to a higher rate. As an instance we may mention, that among the Malta Fencibles, composed of the natives of that island, the average mortality does not exceed 9 per 1000 annually; and among the Cape Corps, composed of the aboriginal inhabitants of Southern Africa, it does not exceed 11 per 1000; while among the Madras native troops it does not exceed 13, nor among those of Bengal is it more than 11 per 1000 annually.

Now were the climate of the West Indies as congenial to the health of the negro troops as that of their native country, it may be inferred that the mortality would not exceed that of the Indian army, which is composed of men about the same age, employed in the same description of military duty, and also in a tropical climate. In so far, then, as it exceeds that rate, it may fairly be attributed to the insalubrious influence of that climate on their constitutions.

It is by no means extraordinary that African troops should suffer as well as the whites from the climate of the West Indies, seeing that they are for the most part natives of the interior of Africa, of which the climate is probably very different; and it is well known that though the indigenous races of tropical as well as of temperate climates are peculiarly fitted by nature for inhabiting and peopling the respective portions of the globe wherein they or their forefathers were born, the effects of a transition to any other is in general productive of a great increase in the ratio of mortality.

It may not, perhaps, be premature here to mention, that the same liability to a high ratio of mortality seems to affect negro troops in almost every quarter of the globe where they have been employed. In the Mauritius they die at nearly the same rate as in the West Indies; in Ceylon, where a considerable number were employed in the colonial corps of that island, the mortality was so high that they nearly became extinct in the course of a few years, notwithstanding every care on the part of the military authorities to keep up their numbers; in Gibraltar, where the 4th West India Regiment was stationed for two or three years, 62 per 1000 of the strength died annually; and even at Sierra Leone, on the sea-coast of their own continent, the mortality has

averaged not less than 28 per 1000 annually, being about double the ordinary ratio among other troops serving in their native country. This demonstrates beyond a doubt that the constitution of the negro can be but little fitted to adapt itself to foreign climates, when even the transition from the interior to the sea-coast of Western Africa has been attended with such prejudicial effects.

The following comprehensive Table shews both the ratio of mortality among the negro soldiers employed throughout the West Indies, and the principal diseases by which it is caused:—

	Annual Ratio of Mortality per 1000 of Black Troops and Pioneers serving in each of the following Colonies.													
	British Guann.	Trinidad.	Tobago.	Grenada.	St. Vincent's.	Barbadoes.	St. Lucia.	Dominica.	Antigua, &c.	St. Kitt's, &c.	Jamaica.	Bahamas.	Honduras.	
Fevers	8.5	3.2	8.6	4.8	.9	3.8	5.2	7.7	1.7	10.5	8.2	5.6	4.4	
Eruptive Fevers.	7.1	. . .	. . .	. . .	1.2	. . .	5.4	.4	.3	. . .	.5	1.7	. . .
Diseases of Lungs	17.9	16.4	12. .	9.5	13. .	18. .	11.5	16. .	16. .	3.9	10. .	9.7	8.1	
" Liver . . . . .	.5	.8	1. .	1. .	. . .	. . .	. . .	1. .	1. .	. . .	. . .	. . .	.8
" Stomach & Bowels	5.8	5.5	4.8	4.2	11.2	12.1	7.1	7.4	3.6	6.3	3. .	6.5	2.8	
Choleia Morbus. . . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	3. .
Diseases of Brain	3.3	2.8	2. .	4.2	2.8	1.9	2.4	.4	1.4	1.4	.6	1.9	1.4	
Dropsies	2.4	1.1	4.3	2.1	2.8	3.1	2.6	1.2	.9	.7	3. .	2.6	1.6	
All other Diseases	2.4	2.9	1.5	2.6	3.7	5. .	4.3	4.5	2.5	2.8	4. .	12.9	7.9	
Total	40.6	39.7	34.2	28.4	36.2	46. .	42.7	39.9	28.9	46.3	30. .	41. .	30. .	
Ratio of Mortality among the Male Slave Population of all ages in these Colonies . }	34. .	30. .	47. .	36. .	34. .	31. .	35. .	35. .	30. .	30. .	. . .	. . .	. . .

From this Table it appears that fevers, particularly those of the remittent and intermittent type, which prove the great source of inefficiency and mortality among the white troops, exert comparatively little influence upon the blacks. Eruptive fevers, especially small-pox, are very fatal to that race, as two died out of every seven attacked. Fortunately that disease never prevailed generally throughout these Commands, but its ravages were principally confined to Trinidad, St. Lucia, and the Bahamas.

Diseases of the lungs, though not so common as among the whites, are productive of much more mortality, owing to the greater prevalence and more fatal character of inflammation of the lungs and consumption, by which nearly twice as many have died as among an equal number of white troops.

The fatal influence of this class of diseases among negro troops is not confined to this Command alone, but, as we shall afterwards shew, it extends to every climate in which they have been employed; thus inducing the supposition that there must be in the constitution of the negro some peculiarity which predisposes him to affections of the lungs. Upwards of two-fifths of all the deaths among these troops have arisen from this class of diseases, and more have died annually by it alone in this Command than among the same number of troops in the United Kingdom by all diseases together, a sufficient evidence how unsuited the climate is to their constitutions.

The negro race suffer to a much greater extent than white troops by

epidemic cholera. When this disease made its appearance at the Bahamas, though none of the white troops died from it, there were 20 of the black troops cut off out of 62 attacked, and it ran very rapidly to a fatal termination. The same has been observed whenever the native troops in the East Indies have been attacked by this disease.

By comparing the mortality of the negro troops with that of the slave population, as stated in the last Table, it will be found that in almost every case the ratio among the troops is the highest, though they are all selected men, and in the prime of life, while the slave returns, on which the preceding estimate is founded, include all classes, infants and aged, sick and healthy. This shews that the high ratio of mortality among the slave population in the West Indies, which has often been referred to as a proof of harsh treatment, rather results from their being transplanted to a climate, which, though perhaps equal in temperature, is far from being that which nature has adapted to the existence and extension of their race.

The preceding observations embrace the principal facts regarding the health of the troops at these stations. Before concluding, however, there are some other topics connected with the same subject which it may be necessary briefly to illustrate.

The mortality detailed in the preceding Tables is not the full measure of the baneful effect of the climate of the West Indies on the constitution of European troops; for it appears from the Report on which these observations are founded, that, on the average of the last 20 years, there have been discharged on account of infirm health and broken constitutions about 24 per 1000 of the strength annually from the Windward and Leeward Command, and 16 per 1000 from Jamaica. That there should be fewer from the latter Command than the former, though it is so much more unhealthy, may readily be accounted for from the circumstance of the diseases in Jamaica running so rapidly to a fatal termination, that but few of the sufferers survive to try the effect of a change of climate.

It might at first be supposed that in a country where the mortality is from 5 to 8 times as high as among troops in the United Kingdom, a corresponding proportion would be constantly on the sick list. This, however, is by no means the case, for it appears that the average of sick on the first day of every month during a period of 20 years was in the Windward and Leeward Command 87 per 1000, in Jamaica 63; while in the United Kingdom the proportion is generally from 45 to 50 per 1000. This peculiarity arises from four-fifths of the mortality in Jamaica being caused by fevers which rapidly terminate either in death or recovery, and only one-fifth from lingering diseases, such as those of the lungs and of the bowels; whereas, in the Windward and Leeward Command, scarcely half of the deaths are caused by fever, and almost all the others are by diseases which detain the patient long in hospital.

From this it will be understood how, during the ravages of epidemic fever, there may be a very great mortality, whilst the hospital may not be much more crowded than usual. Take, for instance, the numbers constantly sick of the white troops in Jamaica at two periods of the same year, one extremely healthy, the other the reverse:—

		Reported Sick in each Month.	Deaths in each Quarter.
1st April, 1827 . .		237	12
1st May, , , . .		236	
1st June, , , . .		194	
1st July, , , . .		251	252
1st August, , , . .		267	
1st September, , , . .		273	

Thus the mortality, in this instance, increased twenty-fold, without the average number in hospital being materially augmented: but the admissions during the last three months were almost entirely from attacks of severe epidemic fever, which rapidly terminating either in death or recovery, one patient soon made way for another, and a whole corps might thus have passed through the hospital in the course of a few weeks, without the proportion of ineffectives exhibiting any extraordinary increase.

The results as to the average extent of sickness to each individual, and the average duration of each attack, as compared with what takes place among the troops in the United Kingdom may be thus stated:—

		Average sick time of each Soldier per annum.	Average duration of each attack of sickness.
In Windward and Leeward } White Troops .		27 $\frac{3}{4}$ days	14 $\frac{1}{2}$ days
Command }	Black Troops .	15 , ,	19 , ,
In Jamaica }	White Troops .	23 , ,	13 $\frac{1}{2}$, ,
In the United Kingdom }		14 $\frac{1}{2}$, ,	16 , ,

Thus, throughout the West Indies, the average duration of each attack of sickness is considerably less than in this country; obviously in consequence of the rapid development of the febrile diseases, which are the principal source of sickness in that climate.

Several interesting questions here occur. Does this mortality affect all ages alike? Does it fall more severely on those recently arrived than on those long resident in the country? Does it affect all ranks and conditions of life equally? To these we can here only reply briefly, referring those who wish for further information to the mass of facts which will be found in the Report on that subject. As to the influence of age, the following are the results framed from observations, and extending over nearly 7000 individuals, for a period of 7 years, from 1830 to 1836 inclusive:—

	Annual ratio of Mortality per 1000 living at the following Ages.			
	18 to 25	25 to 33	33 to 40	40 to 50
Among Troops in the Windward } and Leeward Command }	50	74.	97.	123.
Among Troops in Jamaica Command } In civil life in England, by Carlisle }	70	107.	131.	128.
Tables }	7	8.9	10.7	14.1

Thus instead of the mortality among our troops in the West Indies decreasing with the advance of age, as has been the general impression, it increases with infinitely greater rapidity than in this country; and the same has been found to take place at every station, whether temperate or tropical, to which similar investigations have extended.

That the mortality in Jamaica is, in a small degree, lower between the age of 40 and 50 than between 30 and 40, does not arise from any improvement in constitution, but from the large proportion of men of that class who are invalided and sent home, which has often prevented them from being exposed to the climate during the whole of the year for which the calculation has been made.

The results of a recent investigation by the Secretary of the Bengal Government into the casualties at different ages among the civil and military servants in that Presidency strikingly confirm these deductions as to the progressive increase of mortality with the advance of age in tropical climates.

For instance, out of 1184 deaths among officers in that Presidency, the proportion occurring annually in each rank, and at each age, has been as under :—

Died Annually per 1000 of each Rank :—

Colonels, average Age 61.	Lieut.- Colonels, average Age 51.	Majors, average Age 40.	Captains, average Age 36.	Lieutenants, average Age 18 to 33.	Cornets and Ensigns, average Age 18 to 33.	General Average at all Ages.
59·4	48·4	41·0	34·5	27·5	23·4	31·2

The mortality among the civil servants there, for a period of 46 years, from 1790 to 1836, exhibits almost precisely the same results, viz.—

Died Annually per 1000 of each Class :—

Above 50 Years of Age, and 30 of Service.	Age 45 to 50; Service 25 to 30.	Age 40 to 45; Service 20 to 25.	Age 35 to 40; Service 15 to 20.	Age 30 to 35; Service 10 to 15.	Age 25 to 30; Service 5 to 10.	Age 20 to 25; Service 1 to 5.
48·6	36·4	35·4	23·4	16·6	20·8	19·9

Between 10 and 15 years' service is the period when leave of absence is allowed to those who choose to return to Europe for 3 years, which of course must have a material tendency in reducing the mortality of that class. With this exception the results are uniform for both civil and military servants, and they are no less so when extended to the officers of the other Presidencies.

The reason of the erroneous impression which has hitherto prevailed in regard to persons at an early period of life being most subject to mortality in tropical climates, has principally arisen from the want of that basis of all statistical enquiries on such subjects—an accurate knowledge of the number living at each age, as well as of those who died at that age; when these can be obtained on an extended scale, mortality is found to follow the same law in tropical climates as in any other, except that it proceeds at a much more rapid pace.

These results serve in some measure to solve the question, whether mortality falls more severely on persons who have recently arrived in the West Indies than on those who have been longer resident; for at least three-fourths of the numbers between 18 and 25 years of age were men recently arrived from the depôts, consequently, if they suffered more than the others, it would be impossible for the mortality at that age to be lower than among the more advanced classes, which are composed for the most part of men several years resident in the country.

In the Report no pains have been spared to determine this point, on which many military arrangements of the first importance, connected with the relief of corps, obviously depend. In the space to which these remarks must be confined, it is impossible to enter minutely into all the modes of proof adopted; but the following is extracted, as being probably the most conclusive, since it exhibits an exact comparison between the number of deaths in Jamaica out of each draft which arrived there during a period of 7 years, and those which occurred among the rest of the troops who had been for some years stationed there.

Regiment.	Date of Arrival of the Draft in Jamaica.	Number who joined the Service Companies.	Died within one year after joining	Remained alive at commencement of second year.	Died in second year of residence.	REMARKS.
33rd Foot	November, 1830	12	2	{ Left Jamaica before second year was completed.
22nd ,,	January, 1830	52	5	47	9	
	April and May, 1833	190	10	180	24	
	March, 1834	43	2	41	3	
	January, 1835	9	1	8	..	
	December, 1835	83	2	{ Second year's returns not yet received.
84th ,,	January, 1830	71	7	64	11	
	April and May, 1833	145	13	132	7	Ditto.
	March, 1834	43	..	43	2	
	November, 1834	41	..	41	2	
	January, 1836	23	2	..	..
37th ,,	May, 1833	39	2	37	..	
	April, 1834	54	3	51	1	Ditto.
	November, 1834	37	1	36	6	
	January, 1836	56	9	..	..
56th ,,	April and May, 1833	66	5	61	3	
	May, 1834	20	..	20	..	
	December, 1834	47	2	45	2	Ditto.
	January, 1836	69	5	..	..
64th ,,	January, 1836	57	3	Ditto.
8th ,,	April, 1834	18	3	15	4	Ditto.
	January, 1835	63	12	51	2	
	January, 1836	92	5	..	..
77th ,,	April and May, 1833	150	20	..	..
	Total . . .	1480	114	872	76	

In the course of 7 years, therefore, the numbers and deaths of those least acclimatized, compared with those who had been longer in the island, were respectively as follows:—

	The Total Strength was	The Total Deaths.	Annual Ratio per 1000 of Strength.
Of those under 1 year's residence . . .	1,480	114	77
Of those above 1, but under 2 ditto . .	872	76	87
Total under 2 years' residence	2,352	190	81
The total strength and deaths of all classes in the Service Companies of these Corps was, during the same period }	16,653	1520	91
The difference shews the strength and deaths of those who were longer than 2 years resident in the island to have been }	14,301	1330	93

Thus, while the annual mortality among those resident 1 year only was 77, and of those 2 years resident 87 per 1000, the mortality among those who had been longer in the island averaged 93 per 1000. We have restricted our observations to the first 2 years of residence, because it is during that period the influence of the climate is supposed most to affect those recently arrived; and it would have been an excessively tedious operation to have carried on the investigation with similar accuracy for the subsequent years.

To determine the supposed effect of acclimatization with as much accuracy as the subject will admit, all the returns received from each corps for a period of 20 years have been investigated, and the results tend to similar conclusions. It is, perhaps, unnecessary to enter into the details of the mortality in each corps during so long a period; we shall therefore merely subjoin, in the words of the Report, the deductions which have been arrived at on combining all the information attainable on this subject.

1. That troops are likely to gain but little immunity from either disease or mortality by a prolonged residence in the West Indies. This is established by several instances of corps which have suffered to as great an extent during the latter years of their residence as during the earlier, particularly the 1st, 5th, 9th, 25th, 35th, 67th, 69th, 86th, and 93d, in the Windward and Leeward Command, as well as the 33d, 58th, 61st, and 91st, in the Jamaica Command.

2. That soldiers are not in general liable to any greater mortality during their first year of service there than at any subsequent period. This is shewn, not only by the instances before referred to, but also by the experience of 12 corps out of 21 in the Windward and Leeward Command, and that of the 56th, 58th, 61st, and 64th regiments in Jamaica, in all of which the mortality during the first year of residence was under the general average of the island.

3. That when the circumstances attending the mortality in several of the corps during their first year of residence in Jamaica are minutely investigated, the facts apparently at variance with the above conclusions are sufficiently explained by the occurrence of four epidemics between

1819 and 1827, so that no corps could arrive without encountering their fatal effects within the first year or two of its residence there.

4. That though, in years of ordinary mortality, corps long resident in the island suffer as much or even more than those recently arrived, yet during the ravages of epidemics there appears a partial exemption in favour of the former.

This peculiarity may however be easily accounted for without attributing it to so indefinite a cause, or one so little supported by numerical results as the supposed influence of acclimatization. All the medical reports concur in stating how much the susceptibility to fever is increased by fear and despondency, and these passions we may easily conceive operate much more powerfully upon the minds of men newly arrived in the country than upon those who have perhaps encountered and survived similar epidemics before. We may easily fancy what must be the feelings of a recruit, when he sees a fourth part of his comrades swept off in the space of a month, as was the case in some corps soon after their arrival. We can suppose the apprehension with which he will contemplate the probability of a similar fate, and how little expectation he will entertain of being among the fortunate survivors. He is thus not only rendered more susceptible of the influence of disease, but goes into hospital scarcely with a hope of recovery; whereas the soldier who has been longer accustomed to the mortality of that country possesses not merely the advantage of being less apprehensive, and consequently less susceptible, but even if seized with fever will keep up his spirits, and contend against the violence of an attack under which the other would sink.

We may mention as a remarkable instance of the influence of fear in inducing this disease, as well as of hope in repelling it, that during the epidemic in 1822, among the 91st regiment, at Up-Park Camp, when the order was issued for their removal to another station, the fever ceased, and *though the corps was unexpectedly detained for three or four days after the order was issued, not one case was admitted into hospital in the whole course of that period.*

The origin of the prevailing idea in regard to the advantages of acclimatization, which is so opposed to numerical results, may very probably be traced to the fact that persons long accustomed to the mortality of any station which is particularly insalubrious, seem to become in a great measure unconscious of its extent as compared with what takes place in a healthier climate. We consequently find in Jamaica that if the deaths are a little under 13 per cent., those corps which have been long resident in the island, and accustomed to a higher ratio of mortality, congratulate themselves on having enjoyed what they deem a healthy season. With corps newly arrived from Europe, however, this is not the case; they have been accustomed to a mortality of about $1\frac{1}{2}$ per cent., and when they find it increased tenfold, a stronger impression of the deadly nature of the climate is produced than perhaps double the mortality would occasion in any subsequent year. The soldier, by remaining in the climate, if he become not more seasoned to it, is certainly more unconscious of its fatal effects, and views it with less apprehension, precisely as the veteran regards with coolness and apathy the dangers of the battle field, which create a vivid and perhaps lasting impression on the mind of the recruit.

The official results in regard to the mortality at each age among the military officers and civil servants of the Bengal Presidency, before quoted, afford a convincing proof that in the East Indies also no advantage has hitherto been derived from length of residence. As these individuals are never employed out of India, and generally arrive there about the age of 18 or 20, their respective ages and ranks may be assumed as a criterion for estimating their length of residence in that country. On that principle, then, we find, taking equal numbers of each rank, that the mortality among the ensigns, for the most part youths but recently arrived, is only 23; while that of the lieutenants, who must have been at least three years longer resident to have attained that rank, is 27; and that of the captains, who must have been about 12 or 13 years longer, is 34 per thousand, and so on in a corresponding proportion with the higher grades.

In case it should be objected that this does not exhibit the precise operation of mortality during the first year or two of residence in that country, when the influence of acclimatization is supposed to be most strongly manifested, the following information in regard to the civil servants in the Bengal Presidency will supply that defect:—

	Numbers Alive.	Deaths in First Year.	Ratio of Deaths per 1000 of Living.
1st year of residence . .	975	19	19·5
2nd ditto	933	22	23·5
3rd ditto	906	18	20·
4th ditto	874	19	22·

These observations as to the influence of acclimatization refer to the mortality only. No conclusions can be drawn as to whether the extent of sickness is, or is not, greater among troops newly arrived, than among those who have been long resident, from the want of proper evidence on that subject. It militates, however, very strongly against the former supposition, that in 1831, when no corps or recruits arrived in Jamaica, the admissions from fever alone were 2276, whereas the strength was only 2232. Consequently, on the average, each of these men, *though acclimatized*, must have been treated for fever at least once in the course of the year, which is greatly above the usual ratio even when a large proportion of recruits have joined; and if we take the previous year, 1830, when no corps and only 241 recruits arrived, we find the cases of fever alone to have been 2462 out of a strength of 2842; consequently, on the average, each man must have had an attack once in 13 months. Little benefit then can be expected from length of residence if the susceptibility to fever remains undiminished, as in these instances is clearly proved to have been the case?

It is unnecessary to extend the same train of reasoning to diseases of the bowels, lungs, and liver, which form so considerable a portion of the admissions; because so far are these from ever being benefited by acclimatization, that change of residence is generally recommended as a probable means of inducing recovery.

The next subject of enquiry is, whether the mortality and diseases

from which the troops suffer to such an extent in the West Indies affect all ranks equally. We have already shewn this to be the case in most instances of epidemic, but in years of ordinary salubrity, the officers seem to enjoy a considerable exemption, for while the annual mortality of the troops generally was $78\frac{1}{2}$ per 1000 from ascertained diseases, in the Windward and Leeward Command, that of the officers was but 42; and in Jamaica, where the troops lost 121 per 1000 annually by ascertained diseases, the mortality of the officers amounted only to $83\frac{4}{10}$ per 1000. There is a still greater difference in favour of the officers in the extent of sickness; but then it must be kept in mind that, however slight the disease of a soldier may be, he must be admitted into hospital that it may come under treatment, and every case is consequently recorded; whereas among the officers many of the slight attacks which may be remedied by the use of medicine without regular professional attendance are not taken notice of in the Returns.

Keeping these considerations in view, the following Table will exhibit the relative influence of the principal classes of diseases on officers and privates.

	WINDWARD AND LEEWARD COMMAND.			
	Annual Ratio of Admissions per 1000 of Mean Strength.		Annual Ratio of Deaths per 1000 of Mean Strength.	
	Officers only.	Troops generally.	Officers only.	Troops generally.
By Fevers	358	717	29·	36·9
Eruptive Fevers . . . . .	..	$\frac{2}{10}$	..	..
Diseases of the Lungs	53	115	3·2	10·4
" " Liver	41	22	3·5	1·8
" " Stomach & Bowels	148	421	2·4	20·7
" " Brain	9	28	2·9	3·7
Dropsies	2	$7\frac{8}{10}$	..	2·1
All other Diseases	234	592	1·	2·9
Total	845	1,903	42·	78·5

	JAMAICA COMMAND.			
	Annual Ratio of Admissions per 1000 of Mean Strength.		Annual Ratio of Deaths per 1000 of Mean Strength.	
	Officers only.	Troops generally.	Officers only.	Troops generally.
By Fevers	386	910	69·2	101·9
Eruptive Fevers	1	$\frac{2}{10}$	..	..
Diseases of the Lungs	$35\frac{1}{2}$	$84\frac{6}{10}$	2·	7·5
" " Liver	18	10	1·	1·
" " Stomach & Bowels	77	238	3·6	5·1
" " Brain	5	14	3·6	2·6
Dropsies	$3\frac{1}{2}$	5	2·5	1·2
All other Diseases	111	550	1·5	2·
Total	637	1,812	83·4	121·3

The only diseases by which officers suffer more than privates are those of the liver. This is a very general feature throughout all foreign stations, and may perhaps be accounted for by the circumstance that in the course of an officer's military service he may have been 3 or 4 times in tropical climates with different regiments, and thereby have acquired a greater predisposition to these diseases than the soldier, who, from not changing his corps, rarely serves more than once in such climates. Besides, diseases of this class, as well as those of the brain, are generally most frequent among persons in the higher ranks of life.

The mortality by fever is less among the officers than among the privates in the proportion of 2 to 3, but it is principally from the milder forms of fever that they are exempt. When attacked by remittent or yellow fever, a larger proportion of the cases prove fatal than among the privates.

In regard to the probable causes of the comparative exemption of officers from diseases of the bowels and of the lungs, so strikingly shewn in the preceding Table, we subjoin the following extracts from the Report.

If one class of men is found to suffer more from diseases of the bowels than another, when there appears nothing in their duty or employment to create such a difference, we are naturally led to enquire into the nature of their diet; and on ascertaining from the results of 20 years, that in the one Command, where, for 5 days in the week, it has consisted of salt provisions, the mortality by that class of diseases has been 9 times as high as among the officers, while in the other, where but 2 days' salt provisions have been issued in the week, the mortality of these two ranks approximates so nearly as to be almost on a par, we are led to the conclusion that this cause is likely to have had some influence on the prevalence and fatal character of these diseases in the Windward and Leeward Command.

If it be maintained that the soldier's liability, as compared with that of the officer, arises from his own intemperance or exposure to night-duty, then it may be asked why should not a similar effect be produced in Jamaica, where there is the same intemperance, and the same extent of night-duty to induce it; the cause seems inexplicable, except by referring to the agency of diet, for the results are too uniform, and extended over too long a series of years, to admit of this difference being attributable merely to chance.

The comparative exemption which officers enjoy from diseases of the lungs, both in the Windward and Leeward Command, and in Jamaica, is another very marked result in the preceding table. It will be seen that the mortality by these among the officers amounts at the former station to only about one-fourth, and at the latter to only one-fifth of what occurs among the troops generally—a remarkable circumstance, when we consider how carefully recruits are selected at their enlistment; whereas officers undergo no personal examination, and many of them may therefore be supposed to enter the army with a predisposition to affections of the lungs, which unless counteracted by powerful advantages in their favour, would probably subject them to a higher ratio of mortality by these diseases than the selected portion of the troops.

Of this class of diseases, consumption is the principal source of mortality among the troops. Now if the liability to that disease arose

entirely from the climate of the West Indies, we should expect to see it equally manifested among the officers, whereas though 614 of the troops died in the Windward and Leeward Command, and 327 in Jamaica, of consumption and hemoptysis, which may probably be held as a modification of the same disease, there died of officers but 9 in the former Command, and 3 in the latter, from the same causes. If this remarkable difference is accounted for by supposing that officers may leave the island for change of climate, and their deaths not be reported, then we refer to the relative proportion of officers and men treated, and we find it to be in the Windward and Leeward Command as 6 to 15, and in the Jamaica Command as 4 to 15. Hence we are led to infer, that the great susceptibility of our troops to this disease in the West Indies is not attributable to climate only, but also to some peculiarity in their condition from which officers are exempt.

As to what that peculiarity may be, we do not feel warranted in hazarding any positive assertion; but Sir James Clarke, one of the ablest authorities on pulmonary diseases, states, in a recent treatise on that subject, that improper diet and impure air are the most certain exciting causes of consumption among those not hereditarily predisposed to it, and has even demonstrated, by experiment, that tubercular affections may be induced in animals by confinement in close humid places and innutritious food; consequently, it seems not improbable that crowded barrack-rooms and a restriction to salt diet may, particularly in a tropical climate, produce a similar effect on the constitution of soldiers.

Some, however, may be inclined to attribute the extent of mortality by this disease more to the soldiers' exposure on night-duty than to the influence of diet or accommodation; and though to this supposition we do not mean to offer any positive contradiction, still it is at variance with the fact, that exposure to an equal extent in the cold regions of North America produces little more than half the mortality by pectoral affections which occurs in the warm climate of the West Indies, and that in the East Indies, where the soldier has also the same degree of night exposure, *with a similar temperature*, the mortality by this class of diseases is little more than a fourth of what occurs in the west. The cause cannot well be referred to intemperance, since that prevails to about an equal extent in each of these military Commands.

One of the most convincing proofs on this head, however, is, that the serjeants and corporals, who, from not having to perform the duty of sentinels, are not so much exposed to the night air, and who, from their situation, must be less prone to intemperance, are as subject to mortality as the privates. On comparing the average ratio among these ranks for a period of 5 years, from 1830 to 1834 inclusive, it was ascertained that in the Windward and Leeward Command the mortality of the serjeants was 73, and of the corporals 64, while that of the general mass of the troops was only 57 per 1000; and that in the Jamaica Command the deaths among the serjeants were 108, and among the corporals 95, while the mortality among the troops generally was 109 per 1000. The only persons, except the officers, who seem to have enjoyed any material exemption, are the drummers—a class of men proverbially prone to intemperance, but being for the most part younger than the general mass of the troops, that circumstance has tended to reduce the mortality under

the general average, and to confirm the results formerly obtained in regard to the influence of age in this respect.

Before concluding these remarks, it is necessary to refer to another question which naturally arises from the consideration of these details. Are the troops equally affected by the climate at all seasons? for, were it otherwise, we might hope, by investigating carefully the atmospherical and meteorological phenomena most common at the unhealthy season, to find some solution of the mystery in which the cause of so much sickness and mortality is at present involved. But the following Table, which has been compiled to exhibit the number of admissions and deaths in each month for a long series of years, affords little support for any general theory on that subject.

General Abstract of the Total Admissions and Deaths by all Diseases among the Troops in the following West India Colonies, during the undermentioned periods.

	British Guiana.		Grenada.		St. Vincent's.		Barbadoes.		St. Lucia.	
	For 19 Years.		For 18 Years.		For 19 Years.		For 19 Years.		For 19 Years.	
	Total Admitted.	Total Died.	Total Admitted.	Total Died.	Total Admitted.	Total Died.	Total Admitted.	Total Died.	Total Admitted.	Total Died.
January.	2899	97	785	25	819	32	3366	124	1202	75
February.	2936	86	780	22	893	24	3385	115	1209	77
March.	2743	81	773	22	877	41	3410	116	1168	61
April.	2601	73	819	14	908	31	3895	91	1245	66
May.	2758	59	817	20	1020	29	4389	141	1402	91
June.	3174	103	789	23	1027	38	4202	139	1295	66
July.	4248	180	780	19	971	29	4177	133	1382	62
August.	4720	177	769	27	807	33	4041	131	1337	59
September.	4536	155	880	52	716	37	3599	132	1259	55
October.	4006	113	718	37	673	25	3492	160	1078	68
November.	3387	76	747	32	661	23	3298	178	1185	56
December.	3086	67	729	20	677	16	3127	129	1174	84

	Dominica.		Antigua and Montserrat.		St. Kitt's, Nevis, and Tortola.		Jamaica.		Bahamas.	
	For 19 Years.		For 19 Years.		For 19 Years.		For 18 Years.		For 12 Years.	
	Total Admitted.	Total Died.	Total Admitted.	Total Died.	Total Admitted.	Total Died.	Total Admitted.	Total Died.	Total Admitted.	Total Died.
January.	644	38	1009	56	861	52	7465	559	458	8
February.	533	28	1009	46	709	22	6725	351	377	14
March.	624	41	925	36	646	26	6560	291	467	15
April.	682	34	944	36	765	20	6560	262	482	15
May.	606	22	941	26	868	30	7039	286	570	15
June.	809	29	954	23	844	42	7303	323	476	10
July.	926	39	999	26	796	30	7667	427	527	15
August.	773	69	945	26	809	28	7769	786	568	35
September.	782	51	958	30	818	30	7354	515	747	38
October.	733	75	985	40	799	55	7730	640	765	33
November.	716	91	941	46	809	56	7709	801	659	24
December.	598	45	845	35	764	44	7260	725	544	18

From this Table it appears that though in British Guiana, Jamaica, and the Bahamas, the period from June to November or December is

generally the most unhealthy and most fatal to the troops, that can by no means be regarded as a general rule; for in other colonies, such as Dominica and St. Lucia, every period of the year seems alike unhealthy; and in some of the islands, such as Antigua and St. Vincent's, that period is the most healthy which in others is the reverse.

Our readers will now be prepared to enter on a few general deductions drawn from this mass of statistical facts, and which we subjoin in the words of the Report:—

“It has been supposed by many that the diseases which prove so fatal to Europeans in these latitudes, especially fevers, are, if not a necessary, at least a very general consequence of continued exposure to a high temperature. The sufficiency of this, however, as a uniform cause of sickness and mortality, is contradicted by the fact, that these vary considerably in different stations, the mean temperature of which is nearly alike. The range of the thermometer, for instance, in Antigua and Barbadoes, is rather higher than in Dominica, Tobago, Jamaica, or the Bahamas; yet we find that the troops in the latter stations suffer nearly three times as much as those in the former. The preceding pages also afford several instances in which epidemic fever made its appearance, and raged with the utmost virulence during the winter months—a circumstance not likely to have taken place if that disease had originated in increased temperature. We may also state that the epidemic fevers which prevailed at Grenada in 1793, and at St. Christopher's in 1812, two of the most fatal which ever appeared in the West Indies, commenced, the former in March, and the latter in February, and continued with unabated violence during the whole of the cold season.

“If elevated temperature were an essential cause of the mortality to which Europeans are liable in this climate, we might expect it every year to produce similar effects; whereas, on the contrary, it appears, from the tabular statements in the preceding Report, that the mortality in one year is sometimes 20 times as high as in another, without any perceptible difference in the range of temperature.

“If, as is supposed by some persons, the mortality of the troops depended materially on the influence of moisture, we might expect it to attain its maximum in those stations where the fall of rain was the greatest, whereas the average mortality of the troops in Jamaica is at least double that which prevails among those in British Guiana, though the quantity of rain which falls in that island is little more than half as great: and we have adduced many instances in which epidemic fever has broken out, and raged with great violence, at a period when no rain had fallen for several months; nay, in some stations a dry, in others a wet season, is considered the most unhealthy—an anomaly not likely to occur if excess of moisture were uniformly an essential cause of insalubrity.

“It must also be remembered that this excess of moisture is not confined to the West Indies, but is a general characteristic of all tropical regions: and were it so productive of disease in the Western hemisphere, the same effect might be expected to ensue from it in the East; whereas, on the contrary, the Malabar Coast, which is deluged by rain for six months in the year, is generally one of the most healthy quarters in the Madras Presidency.

"That neither heat nor moisture can be the primary causes which influence the health of troops in the West Indies is at once established. The comparative view of the ratio of mortality in each year at every station, in which there are numerous instances of two adjacent islands, or even of two contiguous stations in the same island, being subject in an equal degree to the operation of these agencies, and yet while the one has been desolated by the ravages of fever, the other has been enjoying a degree of salubrity equal to that of Great Britain.

"Though heat and moisture are not the primary causes of fever, however, it is highly probable their operation tends, in some measure, to increase its intensity. The tables shew that the greatest number of admissions into hospital and deaths has, on the average of a series of years (though not uniformly or equally in each year), taken place in those months when the greatest degree of heat was combined with the greatest moisture; and it may be observed as a striking exemplification of this fact, that as the sun proceeds northward in the ecliptic, carrying heat and moisture in his train, the period generally termed the unhealthy season is later in the northern colonies than in those to the south.

"The unhealthy character of that period of the year in which the greatest degree of heat and moisture is combined is not, however, confined to the West Indies, but extends also to the East, as well as over a large portion of the Northern temperate zone. In the Mediterranean stations particularly, the admissions into hospital and deaths among the troops average nearly twice as high between July and October as during any other months of the year. Even in Canada, the same peculiarity is observable, though not in so marked a degree; and conversely in stations southward of the equator, that period of the year, which on the north of the line is the most unhealthy, becomes in the south the most salubrious, in consequence of the seasons being reversed.

"A knowledge of this fact at once overturns a plausible hypothesis which attributes the unhealthy character of the West Indies, during what is termed the sickly season, viz., from July to October, to the want of the free ventilation afforded by the trade-winds during the rest of the year, but which at this period either cease altogether, or become very irregular. But though these two events, the failure of the trade-winds and the increase of sickness and mortality, take place at corresponding periods, the latter can never be regarded as a necessary consequence of the former, when we find that in other quarters of the globe, beyond the range of the trade-winds, that is, in countries north of the 30th and 32d degree N. Lat., and in which ventilation is quite as perfect at that period as at any other, the unhealthy nature of these months is marked as strongly as in the West Indies.

"This same fact strikes also at the root of another hypothesis, which attributes the sickly season in these regions to some morbid principle generated in the vast forests and savannahs of the South American continent, and wafted to these islands by the south-westerly winds which generally prevail during that period. Besides, were this hypothesis correct, we might expect that British Guiana would, from its proximity to this cause of disease, be most subject to its operation, and consequently the most unhealthy; and that the colonies further to the north, being least exposed to it, would enjoy the greatest degree of

salubrity. The result of our investigations into the comparative mortality in each colony shews, however, that their relative salubrity is by no means affected by their proximity to or distance from that continent.

“To illustrate the influence of local circumstances, in particular, of exhalations or emanations from the soil, we have stated, as accurately as our information will admit, the physical and geological characters of the soil in each island, and in the immediate vicinity of each station; and by comparing these with the mortality there, have ascertained that at many where the soil appears exactly the same the rate of mortality is very different, and at others, where the soil is very different, the rate of mortality is much the same. It is also to be observed that, while the soil and its physical characters are the same in every year, the sickness and mortality are extremely variable, and only in certain seasons and years attain an extraordinary degree of intensity. It frequently happens, too, that a station which has been remarkable for its sickly character for one or two seasons, becomes, without any perceptible reason, just as remarkable for its salubrity, which could scarcely happen if the cause of that sickness and mortality existed in the soil, which was constantly there to produce it.

“The agency, real or supposed, of marshes is liable to a similar objection. That the vicinity of marshes, swamps, and lagoons, is generally subject to fevers, both of the intermittent and the remittent type, is a fact sufficiently established by multiplied experience, both in tropical countries and within the temperate zones. But that remittent or yellow fever may be generated where no such cause is in operation to produce it, and that consequently it is impossible to establish a necessary connexion between this cause and the appearance of that disease, is sufficiently established by the fact that the sickness and mortality in British Guiana and Honduras, where swamps and marshes most abound, are considerably less than at Up-Park Camp, and several of the other stations in Jamaica, remote from the operation of any such agencies.

“The same remark may be applied to excessive or rank vegetation, to the influence of which much of the sickness and mortality at some of the stations has been ascribed. To both of these causes, indeed, the remark already made regarding the influence of the soil, is strictly applicable. The marshy lands and the rank vegetation exist at many of the stations in every year, whereas the disease, which is represented to proceed from them, is only of occasional occurrence, and the foregoing Report shews that in some years the extent of mortality has been ten times as great as at others, when the degree of heat and moisture by which the marshy soils and vegetation are most likely to have been affected have been much the same.

“The object of this Report is rather to point out effects than to speculate upon causes, especially where they are so much involved in doubt and obscurity. We have merely referred to these alleged sources of disease to shew how much they are at variance with numerical results, and because so long as the causes which affect the health of troops in the West Indies are held to be accounted for by theories founded on error, it is not to be expected that others will be started more consistent with truth.”

NOTE BY THE EDITOR.

The value of these statistical investigations to medical science are almost too obvious to require any comment. Their extension over the whole of the foreign possessions of the Crown, which we understand to be the intention of Government, will supply the best information regarding the geographical distribution of diseases and the influence of particular climates in aggravating or ameliorating them, and may, perhaps, by analogical deductions, lead to a knowledge of the causes which render some of the fairest portions of the globe so inimical to European life.

The result of such investigations, extended over the whole globe, will open a new passage in the natural history of man; for, as the colonial corps employed in our foreign possessions are composed of various races, Maltese, Negroes, Hottentots, Cingalese, Malays, and Hindoos, the Returns of the medical officers by whom they are attended, when arranged upon the same principle, and the results condensed as in this Report, will exhibit at one view the diseases to which each of these races are most subject, and the effect of these diseases, as compared with their influence on the constitution of Europeans serving in the same climate. Nor will these statistical details be useful to science alone; but they have already been the means of drawing the attention of Government to the condition of the troops serving in the West Indies, and under the humane and intelligent directions of the Secretary-at-War, have led to many important ameliorations in their condition. The period of service there has been reduced from 10 to 3 years. Fresh provisions have been substituted for salt; improved barrack and hospital accommodation, and healthier localities have been provided for the white troops; and in those islands which proved so exceedingly unhealthy to them garrisons of black troops have been substituted. It is thus that statistical investigations may be rendered available to the best of all purposes, that of improving the condition, increasing the health, and diminishing the sufferings and mortality of our countrymen.

To the Editor of the Journal of the Statistical Society of London.

SIR,—I beg to call your attention to a statement made at p. 315 of the last number of your Journal, respecting the increase of machinery employed in the cotton trade, which appears to me calculated to produce an erroneous and somewhat mischievous impression.

You stated that the steam-power employed in the cotton manufacture in Lancashire and Cheshire has increased, since July, 1835, from 24,597 horses to 39,974, or 62 per cent., or (leaving out the engines merely *in process* of erection) that the increase has been from 24,597 to 35,787 horses, or above 45 per cent.

Now there are only three ways in which this alleged increase can have taken place. 1st, by an increased consumption of the raw material; 2nd, by spinning and manufacturing finer fabrics, which require more machinery for the same weight of cotton; or, 3rd, by adding power-looms to the previously existing spinning-mills, which would thus weave their yarn instead of selling it.

1. Now the consumption of the raw material has only increased from 18,167 bags weekly, in 1835, to 20,785, in 1837, or 14½ per cent.